

Regenerative Agriculture

An Alternative Approach for a Sustainable Future



An IFG Insights Presentation

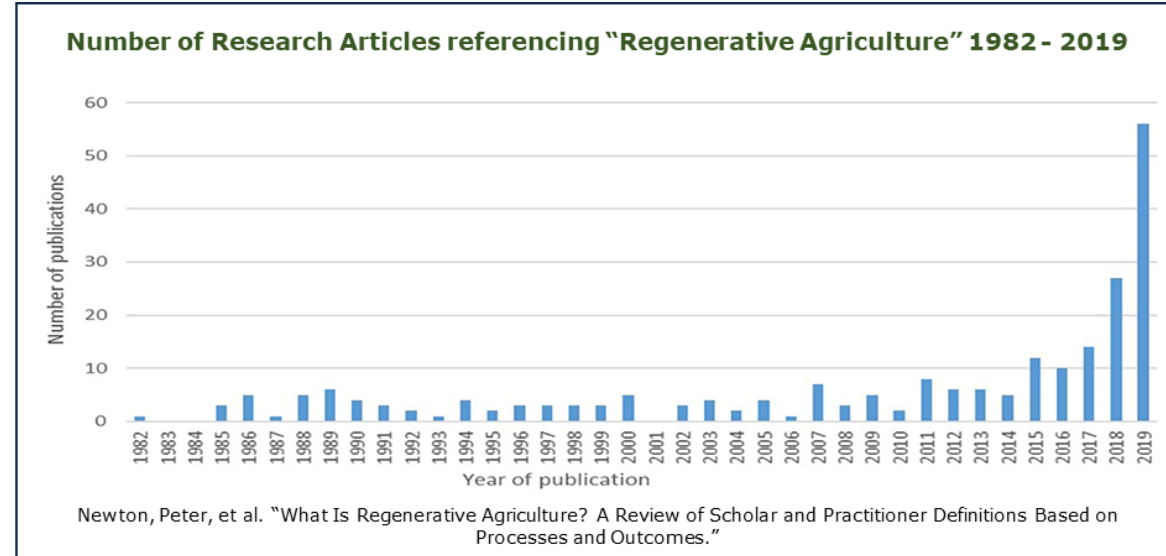
WHAT IS REGENERATIVE AGRICULTURE? OVERVIEW

Regenerative Agriculture

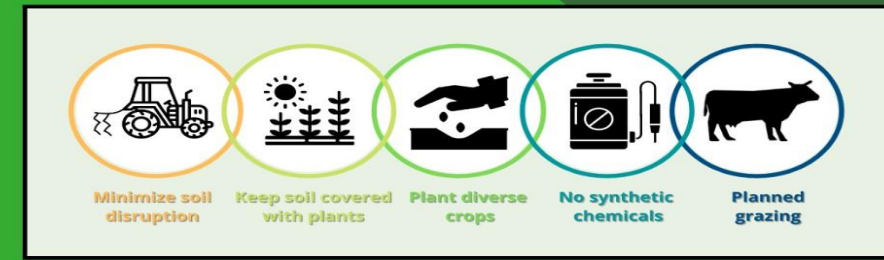
Regenerative agriculture is an alternative farming approach aimed at enhancing food production's sustainability. It is recognized for its potential to provide environmental and social benefits, such as improving soil health and restoring degraded lands, which in turn enhances water quality, vegetation, and land productivity. Moreover, it plays a role in climate change mitigation by potentially sequestering more carbon dioxide than it produces.

This agricultural strategy has received substantial attention from various sectors including researchers, educators, government bodies, and media. Educational institutions are focusing on teaching the benefits of regenerative agriculture and its contribution to climate action plans. For instance, international bodies like the Intergovernmental Panel on Climate Change have listed regenerative agriculture as a sustainable land management practice.

Regenerative agriculture's core principles center around improving soil health, increasing biodiversity, sequestering carbon, advocating for the humane treatment of livestock and farmworkers, and enhancing the overall ecosystem. It encompasses practices like crop rotation, cover cropping, minimal tillage, managed grazing, and animal integration, with an emphasis on composting. These practices stem from a blend of contemporary scientific knowledge and traditional farming practices cultivated by various cultures and communities worldwide. Regenerative agriculture aims to foster a food system that meets the needs of both the present and future generations, paving the way for a more sustainable and resilient future for agriculture.



The Five Principles of Regenerative Agriculture



- Minimize soil disruption
- Keep soil covered with plants
- Plant diverse crops
- No synthetic chemicals
- Planned grazing

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Regenerative Agriculture

Objectives and Targets

- **Improve Soil Health**
- **Increase Biodiversity**
- **Sequester Carbon**
- **Prioritize Humane Treatment**
- **Enhance Ecosystem Health**
- **Foster Animal Integration**
- **Emphasize Waste Reduction**
- **Promote Climate Resilience**



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WHAT IS REGENERATIVE AGRICULTURE? IMPROVING SOIL HEALTH

Overview

Improving soil health is a key aspect of regenerative agriculture, focusing on maintaining the soil's natural structure, enhancing fertility, and supporting a diverse soil microbiome. Techniques used include no-till or reduced-till farming, which limit soil disruption and erosion, and the use of cover crops to add organic matter and natural nutrients to the soil. Composting is also employed to recycle organic waste into nutrient-rich soil amendments. Additionally, green manure—crops specifically grown to be returned to the soil—contributes to enhancing soil fertility. Together, these practices form a comprehensive approach to nurturing soil health in a regenerative agricultural system.

No-Till and Reduced-Till Systems

No-till and reduced-till systems are crucial soil conservation practices in regenerative agriculture that minimize soil disturbance and reduce erosion. In traditional farming, tilling can lead to soil compaction, organic matter loss, microbiome disruption, and significant erosion. No-till farming counteracts this by allowing seeds to be planted directly into the residue of a previous crop without disturbing the soil, preserving the soil structure, enhancing organic matter accumulation, and reducing runoff risks by preserving soil moisture. On the other hand, reduced-till or conservation tillage offers a balance where only necessary tillage is conducted, leading to less soil disturbance than conventional methods while still permitting some soil preparation.



Cover Crops

Cover crops, including grasses, legumes, and brassicas, are strategically grown primarily for soil enhancement rather than crop yield. Planted during off-season periods to prevent bare soils, cover crops shield the soil from erosion, reduce nutrient leaching, and add valuable biomass that increases soil organic matter. This biomass nourishes soil microbes, thereby boosting soil fertility and improving its water-holding capacity. Specific cover crops, like grasses, excel at preventing erosion and nutrient scavenging, while legumes can naturally fix nitrogen in the soil, decreasing the dependence on synthetic fertilizers. Furthermore, cover crops contribute to weed suppression and pest management by interrupting the lifecycle of pests and diseases.



WHAT IS REGENERATIVE AGRICULTURE? IMPROVING SOIL HEALTH

Composting

Composting, the controlled decomposition of organic material into a nutrient-rich, soil-like substance, is an essential practice in regenerative agriculture for nutrient recycling and waste reduction. It involves creating the optimal environment for microorganisms to break down organic matter, balancing carbon and nitrogen-rich materials, maintaining suitable moisture, and ensuring sufficient oxygen through regular turning or aeration. The resultant compost is a potent soil amendment teeming with nutrients and beneficial microorganisms. When incorporated into the soil, it improves soil structure, enhances water retention, provides slow-release nutrients to plants, and promotes a diverse soil microbiome instrumental in disease suppression and nutrient cycling. Thus, composting enables the efficient recycling of waste materials back into the farm system, enhancing its overall sustainability.



Green Manure

Green manure is a regenerative agricultural practice that involves growing and then incorporating specific crops into the soil to enhance its fertility and organic matter content. The selected crops, often legumes, grasses, or cover crops, are grown and then tilled into the soil while they're still green and full of nutrients. This process not only adds valuable organic matter to the soil but also releases a rich supply of nutrients as the green manure decomposes, providing a natural, sustainable source of fertility. Nitrogen-fixing plants like clover or vetch are particularly beneficial as green manure, as they draw nitrogen from the air and store it in their roots, which is then released into the soil upon incorporation. Green manure crops also provide the added benefits of suppressing weeds, improving soil structure, enhancing water retention, and helping to break pest and disease cycles, contributing to the overall health and productivity of the soil ecosystem.



WHAT IS REGENERATIVE AGRICULTURE? INCREASING BIODIVERSITY

Overview

Increasing biodiversity is a central tenet of regenerative agriculture, with the objective of creating a thriving and diverse ecosystem. Practices such as polyculture, agroforestry, and integrated pest management are used to enhance biodiversity on the farm. Polyculture involves growing multiple crops in the same space, which promotes a variety of plant species and reduces pest pressures. Agroforestry, which combines trees, crops, and/or livestock on the same land, provides habitats for various species, contributing to a richer ecosystem. Integrated pest management employs natural predators and plant diversity to control pests instead of relying on synthetic pesticides. These strategies, when used collectively, offer a holistic approach to boosting biodiversity in a regenerative agriculture context.

Polyculture

Polyculture is a farming practice in regenerative agriculture that promotes biodiversity by growing multiple crop species within the same area. This practice contrasts with conventional monoculture farming, where large plots of land are dedicated to a single crop. By incorporating a variety of crops, polyculture creates a diverse ecosystem that can improve soil health, reduce pest pressure, and decrease the dependency on artificial fertilizers. The crops are selected based on their compatibility and the benefits they can provide to each other, such as pest deterrents, shade provision, or nutrient contribution to the soil. The successful implementation of polyculture requires careful planning and management, but the environmental benefits and potential for increased yield make it a cornerstone of regenerative agriculture.



WHAT IS REGENERATIVE AGRICULTURE? INCREASING BIODIVERSITY

Agroforestry

Agroforestry, another key practice in regenerative agriculture, involves the integration of trees, crops, and sometimes livestock on the same parcel of land. This method enhances biodiversity by providing various habitats that attract different species of insects, birds, and other wildlife. Trees can offer shade and shelter for crops and livestock, assist in nutrient cycling, and help in controlling soil erosion. The selected tree species often provide additional benefits such as fruit, timber, or fodder. The integration of these different components creates a symbiotic relationship where each part supports the others.

Integrated Pest Management

Integrated pest management (IPM) is a key strategy in regenerative agriculture that uses a combination of biological, cultural, physical, and chemical methods to control pests. Instead of relying solely on synthetic pesticides, IPM promotes the use of natural predators and plant diversity to keep pest populations in check. Crop rotation, intercropping, and the introduction of beneficial insects are common practices in IPM. This approach minimizes harm to the environment, reduces the risk of pests developing resistance to pesticides, and can lead to improved crop health and yields. By focusing on long-term prevention and ecosystem management, IPM contributes to increased biodiversity and the overall sustainability of agricultural systems.



WHAT IS REGENERATIVE AGRICULTURE? CARBON SEQUESTRATION

Overview

Carbon sequestration is a key pillar of regenerative agriculture, contributing significantly to climate change mitigation by absorbing and storing atmospheric carbon dioxide in plants and soil. One such technique is the use of biochar, a form of charcoal derived from plant matter that, when applied to the soil, acts as a potent carbon sink, locking away carbon for potentially thousands of years. Perennial cropping systems, where crops grow year-round to cover and protect the soil, also contribute to carbon sequestration, enhancing soil health and biodiversity along the way. Moreover, managed grazing systems, which strategically rotate livestock across pastures to allow for periods of recovery and growth, can boost soil health and productivity, further aiding in carbon storage. These practices illustrate the holistic and sustainable approach of regenerative agriculture in not only promoting biodiversity and soil health, but also actively sequestering carbon.

Biochar

Biochar is a type of charcoal produced through a process known as pyrolysis, where plant matter like wood waste or crop residues is heated in a low oxygen environment. This process transforms the plant matter into a highly stable, carbon-rich substance that is resistant to decomposition. When incorporated into soil, biochar serves as a carbon sink, sequestering carbon that would otherwise be released into the atmosphere as carbon dioxide. Moreover, due to its porous structure, biochar can improve soil fertility by enhancing water retention and nutrient availability. Its use not only bolsters soil health and productivity but also contributes to climate change mitigation by significantly increasing the soil's capacity for long-term carbon storage.



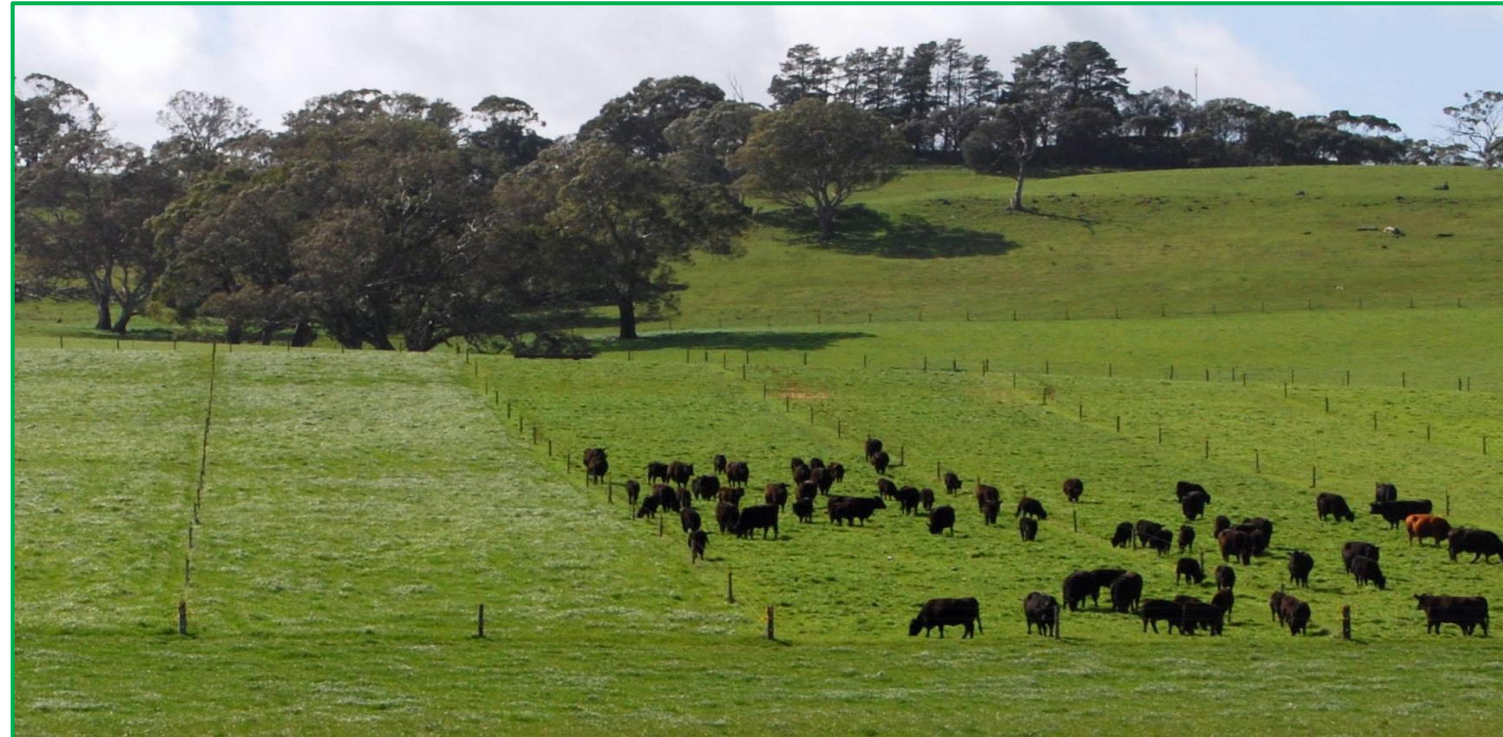
WHAT IS REGENERATIVE AGRICULTURE? CARBON SEQUESTRATION

Perennial Cropping Systems

Perennial cropping systems involve the cultivation of crops that persist and remain productive for more than two years, eliminating the need for annual tilling or replanting. These systems establish a constant plant cover, thereby improving soil structure and water retention while reducing soil erosion and nutrient runoff. Perennial crops, with their deep and extensive root systems, are particularly adept at absorbing carbon from the atmosphere and storing it in the soil, thus enhancing soil health and biodiversity. In addition, because these systems require less frequent disturbance than annual cropping systems, they aid in preserving the soil's carbon content and fostering a more resilient and sustainable agricultural system.

Managed Grazing Systems

Managed grazing systems, also known as rotational or mob grazing, involve carefully directing the movement of livestock across pastureland to prevent overgrazing. This strategy allows grazed areas sufficient time to recover and regrow, promoting biodiversity and maintaining the health of the grasslands. In addition to helping distribute manure evenly across the land - enriching the soil and increasing its capacity for carbon capture - the animals' trampling also aids in incorporating organic matter into the soil. This increased soil organic matter content further aids in carbon sequestration. Thus, managed grazing systems not only enhance soil health and pasture productivity but also contribute substantially to the sequestration of carbon, making them a critical element of sustainable and regenerative agriculture.



WHAT IS REGENERATIVE AGRICULTURE?

KEY FINDINGS

Soil Organic Matter on Regenerative and Conventional Corn Farms

Reference town	Farm locations (latitude, longitude)	SOM (%)
Bladen, NE ★	40.31971, -98.57358	6.23
Bladen, NE	40.33703, -98.56301	4.52
York, NE ★	40.63054, -97.66534	6.21
York, NE	40.97390, -97.49031	5.55
Bismarck, ND ★	46.85280, -100.60131	4.19
Bismarck, ND	46.85280, -100.35145	N/A
Bismarck, ND ★	46.81734, -100.51257	5.82
Bismarck, ND	47.14250, -100.19720	3.85
White, SD	44.42572, -96.58806	N/A
White, SD ★	44.41155, -96.60008	5.52
Pipestone, MN	44.11446, -96.32468	N/A
Pipestone, MN	44.12416, -96.36422	4.75
Toronto, SD ★	44.59248, -96.57923	7.60
Toronto, SD	44.57960, -96.58367	6.38
Gary, SD ★	44.80565, -96.34708	7.53
Gary, SD	44.80689, -96.35465	7.36
Arlington, SD	44.41566, -97.18795	8.17
Arlington, SD ★	44.42644, -97.25077	8.18
Lake Norden, SD	44.58976, -97.08649	4.56
Lake Norden, SD ★	44.55.6839, -97.243820	6.26

LaCanne1, Claire E., et al. "Regenerative Agriculture: Merging Farming and Natural Resource Conservation Profitably."

★ Represents a Regenerative Corn Field

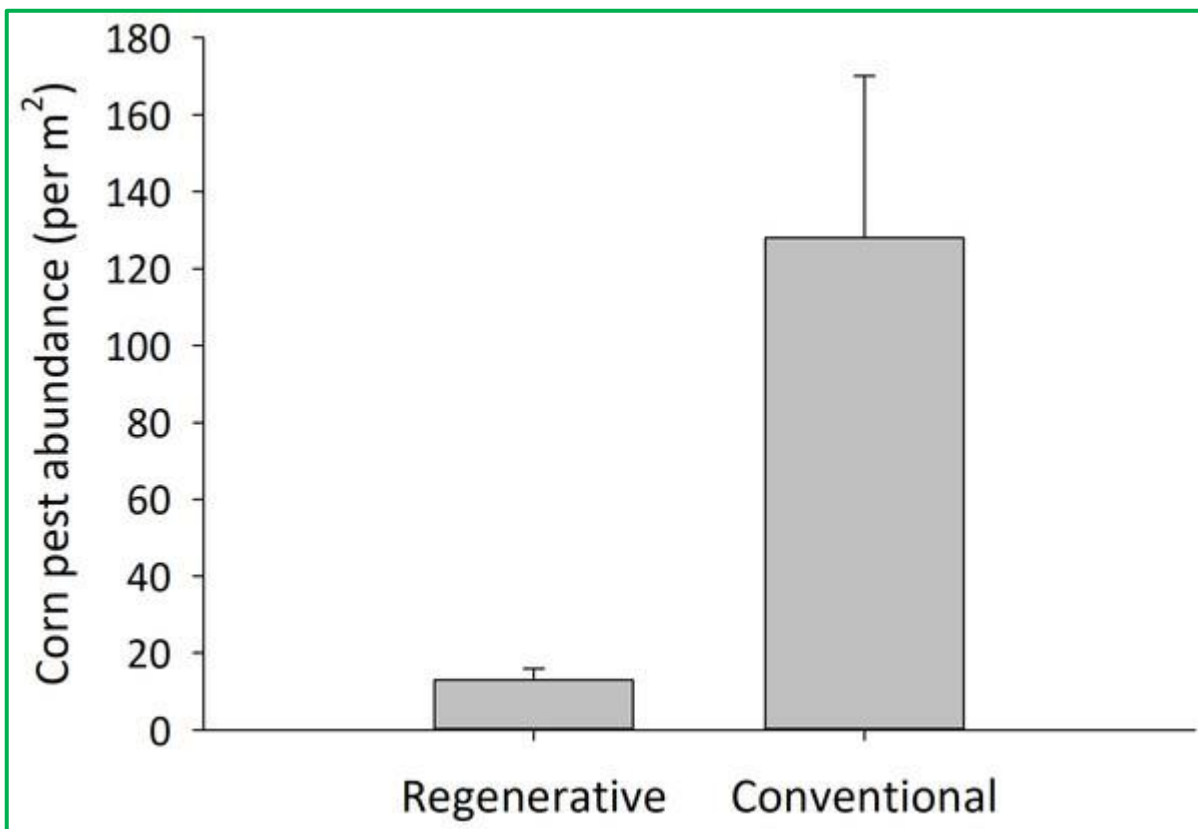
Takeaway

Research findings have shown that farms incorporating regenerative practices, specifically those with regenerative corn fields, boast a higher soil organic matter (SOM) content when compared to conventional farms. In an empirical analysis, the levels of SOM were found to be markedly elevated in the regenerative farms' soil profiles. This disparity underscores the substantial influence of regenerative practices on enhancing SOM. Notably, these regenerative methods prioritize fostering a strong soil biology, driven by plant communities that actively sequester CO2 from the atmosphere. The resultant increase in SOM is a testament to the efficacy of regenerative farming in generating SOM in cropland.

Soil Organic Matter (SOM) is a cornerstone for achieving agricultural sustainability and productivity. It significantly improves soil structure, facilitating enhanced water absorption and encouraging a more robust ecosystem teeming with diverse microbial life and invertebrates. An increase in SOM, often seen in regenerative agricultural systems, is indicative of soil health and vitality. Furthermore, SOM is intricately connected with Particulate Organic Matter (POM), with a rise in SOM levels correlating to an increase in POM. This correlation underpins the health of the soil ecosystem, and it's a key element of soil fertility. Moreover, the increased SOM content also assists in carbon sequestration, reinforcing regenerative agriculture's role in combating climate change and contributing to environmental sustainability.

WHAT IS REGENERATIVE AGRICULTURE? KEY FINDINGS

Pest Abundance in Insecticide-Treated and Untreated, Regenerative Cornfields



LaCanne1, Claire E., et al. "Regenerative Agriculture: Merging Farming and Natural Resource Conservation Profitably."

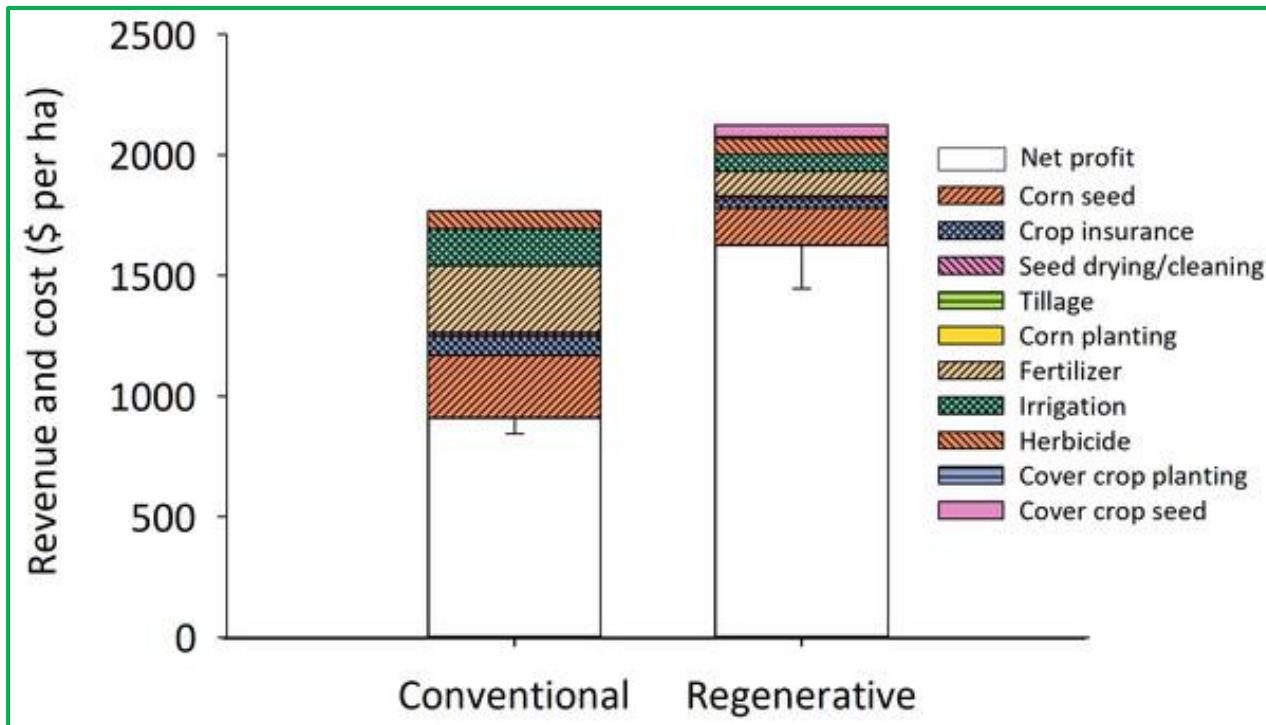
Takeaway

In a comparison between insecticide-treated and untreated cornfields, the treated fields surprisingly had more pests. These included various types such as corn rootworm adults, European corn borers, Western bean cutworm, other caterpillars, and aphids. The abundance of these pests was assessed during corn anthesis. It's interesting to note that the farmers managing these fields considered their pest management strategies as best for their regions. However, despite the use of neonicotinoid-treated, Bt corn seeds and additional insecticide sprays, conventional farms still showed a higher pest presence compared to untreated, regenerative cornfields.

The significance of these findings can't be understated. The higher pest abundance in treated cornfields compared to regenerative cornfields, which employed practices like multispecies cover crops and the abandonment of insecticides and tillage, underscores the effectiveness of regenerative farming methods. This difference in pest abundance between the two types of cornfields wasn't minor either - it was statistically significant. This evidence suggests that regenerative practices, which work in harmony with natural ecosystems, can actually help to reduce pest problems, presenting a viable and sustainable alternative to conventional pest management strategies.

WHAT IS REGENERATIVE AGRICULTURE? KEY FINDINGS

Profitability of Regenerative vs Conventional Corn Fields



LaCanne1, Claire E., et al. "Regenerative Agriculture: Merging Farming and Natural Resource Conservation Profitably."

Takeaway

Based on collected data, regenerative corn fields have been reported to generate nearly double the profit of conventionally managed corn fields. This comparative study, which took into account the gross profits across all 40 fields for each treatment, highlighted the significantly increased profitability of the regenerative approach. Profit was calculated considering the direct costs and revenues associated with each field, excluding overhead and indirect expenses. The practices implemented in these regenerative corn fields, such as multispecies cover mixes and the integration of livestock, have played a substantial role in increasing the profitability, demonstrating that regenerative systems had a 70% higher profit margin than conventional cornfields.

The implications of these findings are quite profound. Firstly, the substantial profit difference reiterates the economic viability of regenerative agricultural practices, which is crucial for farmers considering transitioning from conventional methods. Moreover, the positive economic outcomes of regenerative practices can serve as a powerful incentive for wider adoption, enabling a more sustainable and resilient agricultural industry. The increase in profitability also underscores the benefits of implementing a greater number of regenerative practices. Last, even though costs related to seed drying, corn planting, and cover crop planting were part of the process, their impact on the overall costs was negligible, further highlighting the economic efficiency of regenerative farming as an alternative to conventional pest management strategies.

WHAT IS REGENERATIVE AGRICULTURE? IFG'S APPROACH



IFG's Approach to Regenerative Agriculture

We believe embracing regenerative agriculture is central to humanity's commitment to a healthier planet. This approach goes beyond sustainability to actively restore and regenerate ecosystems, contributing significantly to biodiversity and soil fertility, and leading to a reduction in the need for chemical fertilizers and pesticides. By supporting regenerative agriculture, we're investing in the future of our planet, promoting a model of farming that can potentially reverse environmental degradation and combat the challenges of climate change. In the long run, we believe that such environmentally sound strategies will prove to be not just ethical choices, but sound financial decisions as well.

We see our commitment to regenerative agriculture not just as an investment in the environment, but also as a strategic approach to risk management and long-term profitability. We believe in supporting businesses that prioritize regenerative farming, a move that promotes the health of soil and ecosystems, leading to more productive and resilient farms. This strategy does more than just stabilize returns for our investors; it contributes to a future where our portfolios are more resistant to the financial implications of climate change. By embracing regenerative practices, we are playing our part in enhancing carbon sequestration, reducing greenhouse gas emissions, and truly future-proofing our investments. This approach underlines our dedication to the cause and our belief that financial prudence and environmental stewardship can, and indeed must, go hand in hand.

We believe that regenerative agriculture provides us with an opportunity to create real societal impact while generating attractive returns for our clients. By backing businesses that use regenerative farming methods, we promote food security, rural development, and biodiversity, aligning with the growing desire of investors to support ESG compatible businesses. As a forward-thinking Investment, Advisory, and Asset Management company, we believe investment opportunities that promote and support regenerative agriculture practices can deliver both attractive returns and positive societal change.

WHAT IS REGENERATIVE AGRICULTURE? INDUSTRY SUPPORT

Industry Support of Regenerative Agriculture Efforts

As we navigate towards a sustainable future, large corporations, with their significant resources and influence, play a crucial role in transitioning traditional farming to more sustainable and regenerative practices. This shift, enhancing environmental well-being and supply chain resilience, simultaneously promotes biodiversity and ensures long-term business sustainability.

PepsiCo and Walmart Partnership

Illustrating this commitment is the recent partnership between PepsiCo and Walmart. They've pledged up to \$120 million of investments over seven years to support U.S. and Canadian farmers in enhancing soil health and water quality. Their aim is to foster regenerative agriculture across over two million acres of farmland, aspiring to reduce and remove around four million metric tons of greenhouse gas emissions by 2030. This initiative, tantamount to the power consumption of about 778,300 homes for a year, signifies the profound impact possible when corporations embrace environmental responsibility. This partnership exemplifies the harmony between corporate responsibility and environmental stewardship in driving towards a sustainable future.



WHAT IS REGENERATIVE AGRICULTURE? INDUSTRY SUPPORT

Industry Support of Regenerative Agriculture Efforts

General Mills has also joined the ranks of large corporations supporting regenerative agriculture through a notable initiative. In a commitment to advance regenerative practices on one million acres of farmland by 2030, General Mills is investing in farmers directly and providing them with the necessary resources to transition. The company aims to enhance soil health, biodiversity, and farmer economic resilience. The project involves extensive farmer training and education in regenerative agriculture principles, such as crop rotation and cover cropping, to maximize productivity, reduce chemical dependency, and increase carbon sequestration.

Meanwhile, the multinational food and beverage corporation, Nestlé, has made a significant commitment in this area as well. Their 'Regenerative Food Initiative' is designed to help transition their sourcing areas to regenerative farming methods by 2030. The initiative includes substantial funding for farmers, agricultural education, and infrastructure development necessary for this shift. Furthermore, they're focusing on improving soil health, increasing biodiversity, and reducing carbon emissions across their supply chains. These efforts underscore how global giants can leverage their reach and resources to drive a paradigm shift towards regenerative agriculture, promising long-term environmental, economic, and societal benefits.

General Mills grows **REGENERATIVE AGRICULTURE** leadership by launching **DAIRY PILOT**



General Mills is partnering with Foremost Farms and Understanding Ag to pilot, measure and advance regenerative agriculture practices on dairy farms. Our aim is to reduce greenhouse gas emissions, improve animal welfare and soil health, and increase farmer profitability.

3
FARMS



Three dairy farms in western Michigan are part of the pilot.

1.5K
ACRES



These dairies manage 14,000 acres of crop land to feed their cows. Our goal is to introduce regenerative practices on 1,500 acres including cover crops, plant diversity and adaptive grazing to build soil health.

5+
GENERATIONS



The pilot farms represent more than 5 generations of dairy farming. Regenerative agriculture works with a farm's natural ecosystem to improve overall resiliency and support farmer profitability.

<100
MILES



The milk from these pilot farms travels less than 100 miles to fill your favorite cup of Yoplait.

This is the 3rd pilot we have launched since making our commitment in 2019 to **advance regenerative agriculture on 1 million acres of farmland by 2030.**

SUPPORTED BY:



WHAT IS REGENERATIVE AGRICULTURE? IFG ASSET MANAGEMENT



IFG Asset Management, LLC serves as an Advisor and Investor specializing in the private Real Assets sector, focusing on areas such as food & agribusiness, energy, renewable materials, infrastructure, and more. With a team that combines decades of experience, IFG not only offers sound financial advice, but also pioneers insights and aims to set the benchmark for transformative and impactful investments.

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- **IFG's Merchant Banking** capability has the Firm serving as both a trusted financial advisor and direct investor, resulting in stronger alignment of interests and long-term value-add
- **IFG's Asset Management** business offers specialized direct private equity funds, private equity manager co-investments, Merchant Banking direct investments on a deal-by-deal basis, and specialized multi-manager funds to leverage the Firm's fourteen years of Real Assets investment experience and deep specialized private equity manager relationships

IFG's proprietary deal flow focuses on long-lived assets, barriers to entry, and attractive risk-adjusted returns, including potential for current yield.

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IFG stands at the nexus of entrepreneurial management teams, proprietary investment opportunities, and sophisticated private investors

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- Commodity producers
- Ingredients providers
- Food and beverage processors
- Co-packers
- Storage and distribution
- Timber and forest products



Infrastructure

- Water infrastructure
- Power generation and transmission
- Data and communications
- Energy storage
- Environmental infrastructure
- Sustainable building materials



Bioeconomy

- Circular economy
- Biofuels and renewables
- Low value feedstock to high value products
- Specialty chemicals
- Recycling and waste management
- Feedstock providers



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